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I, JANENE PEISKER, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2003906845 for a patent by AMCOR LIMITED as filed on 09 December 2003.



WITNESS my hand this
Twenty-third day of December 2004

A handwritten signature in cursive script, appearing to read 'J. Peisker'.

JANENE PEISKER
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AUSTRALIA
Patents Act 1990

PROVISIONAL SPECIFICATION

Applicant(s):

AMCOR LIMITED

A.C.N. 000 017 372

Invention Title:

BULK PACKAGING SACKS AND APPARATUS FOR MANUFACTURING
THE SACKS

The invention is described in the following statement:

BULK PACKAGING SACKS AND APPARATUS FOR MANUFACTURING THE SACKS

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The present invention relates to sacks that are often used for bulk packaging of products and to an apparatus for forming a top block end on the sacks after the sacks have been filled with product.

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Typically, bulk packaging sacks are understood herein to mean sacks that are used to package 20 kg plus amounts of products.

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The present invention relates particularly, although by no means exclusively, to bulk packaging sacks that are in the form of multi-wall sacks of the type which comprise an outer bag, typically made from paper-based products, and an inner pouch, typically made from a polymeric material.

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The present invention relates more particularly, although by no means exclusively, to bulk packaging sacks that are in the form of multi-wall sacks of the type described in the preceding paragraph which are suitable for bulk packaging of dried food products, such as powdered milk products.

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The inner pouch of the above-described multi-wall sacks is provided for storing powdered milk products (and other dried food products) under sterile conditions. The outer bag shields the inner pouch from direct contact with potential sources of contamination while the multi-wall sacks are stored at an initial production and packaging site, transported to downstream processing sites, and stored at the processing sites prior to the packaged products being processed at the sites.

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Australian patent 729303 in the name of the applicant discloses multi-wall sacks of the type described above and a method of forming a top block end on the sacks after the sacks have been filled with product. The sacks
5 comprise an outer bag, typically made from paper-based products, and an inner pouch, typically made from a polymeric material. The sacks are characterized in that the sacks, when filled and closed, comprise a bottom block
10 end and a top block end. The method comprises filling the inner pouch with product, such as dried powdered products, via an open top end of the sack, closing the inner pouch, and folding and gluing the outer bag at the open top end in a particular sequence of steps into a closed top block
15 end.

Australian patent 760523 in the name of the applicant also discloses multi-wall sacks of the type described above that comprise an inner polymeric material
20 pouch and an outer paper bag that are manufactured with an open top end through which product can be filled into the inner pouch and thereafter closed. The sacks are characterised in that the top end of the sacks is formed as an "easy" open end to facilitate access to the sealed
25 inner pouch.

The disclosure in the above-described Australian patents is incorporated herein by cross reference.

30 The applicant has made improvements to the multi-wall sacks described in the Australian patents. The applicant has also developed an apparatus for sealing then sacks after the sacks have been filled with product and then folding the outer bag at the top end of the sack to
35 form a top block end. The applicant has also realized that the apparatus, in a modified method of operation, can be used to form a top block end on other bulk packaging

sacks, such as sacks that comprise outer bags but do not comprise inner pouches. The subject patent specification relates to the improvements.

5 Specifically, the applicant has developed a particular form of an as-manufactured multi-wall sack that has the closed bottom block end and can be filled and closed so that it has the closed top block end of the sacks of Australian patent 729303.

10 In addition, the applicant has developed a particular form of an as-manufactured multi-wall sack that has the closed bottom block end and can be filled and closed so that it has the closed top block end of the
15 sacks of Australian patent 729303 and the "easy" open top end of the sacks of Australian patent 760523.

 The applicant has also developed an apparatus for forming a top block end on the above-described sacks after
20 the sacks have been filled with product:

 In general terms, the present invention provides an as-manufactured multi-wall sack that comprises an inner pouch, typically made from a polymeric material, and an
25 outer bag, typically made from a paper-based material, with the sack having a top end that (a) is open in the as-manufactured form of the sack so that the sack can be filled with product via the open end and (b) and is formed so that it can be closed to form a top block end.

30 Preferably the sack of the present invention has the following features, either separately or in combination.

35 1.. In the as-manufactured form of the sack, the sack comprises pressure adhesive that connects together the inner pouch and the outer bag at the open top end of the

sack. The amount and/or the type of adhesive is selected so that the adhesion of the inner pouch to the outer bag is greater on one of a front or a rear side of the sack than on the opposite side of the sack so that, as part of a sequence of steps to close the outer bag after a step of heat sealing the inner pouch closed, the front and rear sides of the outer bag can be folded outwardly with the sealed inner pouch being selectively detached from one of the sides of the outer bag and being retained by the other side. Retaining the sealed inner pouch on a selected one of the sides is important to the subsequent sequence of steps to close the outer bag. The decision to fold the front and rear sides outwardly as part of the sequence of steps to close the sack is advantageous in terms of downstream processing because it means that the sealed inner pouch is positioned on one of the sides and this frees up the other side and makes it possible for the other side to be a contact surface for adhering the outer bag in a closed position using heat-activated adhesive without having to be concerned about the impact of heat required to activate the adhesive on the polymeric material of the inner pouch. Other closing sequences would not have this advantage.

2. In the as-manufactured form of the sack, the sack comprises heat-activated adhesive on sections of the outer bag that adhere to other sections of the outer bag as part of the sequence of steps to close the outer bag.

3. In the as-manufactured form of the sack, the positions of the sections of the outer bag that carry heat-activated adhesive are selected so that the sequence of steps to close the outer bag where possible positions the heat-activated adhesive sections so that the sections do not overlie the inner pouch. This ensures that the application of heat to activate the heat-activated adhesive does not damage the inner pouch.

The sack comprises an "easy" open feature on the outer bag that facilitates opening the outer bag after it has been closed.

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According to the present invention there is also provided a filled and sealed bulk packaging sack formed by filling and closing the above-described as-manufactured multi-wall sack.

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Preferably the bulk packaging sack also comprises a vent seal to allow air to escape from the inner pouch after the inner pouch has been closed.

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Preferably the vent seal defines a tortuous flow path for air to escape from the closed inner pouch.

Preferably the bulk packaging sack also comprises product identification coding applied to the inner pouch after filling the as-manufactured multi-wall sack with product and prior to closing the outer bag.

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Preferably the bulk packaging sack also comprises product identification coding on the outer bag.

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According to the present invention there is also provided an apparatus for forming a top block end on the above-described as-manufactured multi-wall sack after the sack has been filled with product, which apparatus comprises:

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(a) a means for supporting opposed front and rear sides of a filled sack having an open top end as the sack is moved between and operated on at the following stations;

35

(b) a first sealing station for bringing

opposed sides of the open top end of the inner pouch into contact and heat sealing the opposed sides together and thereby closing the inner pouch;

5 (c) a first folding station for folding the opposed sides of the outer bag outwardly and forming out-turned sides and in-turned triangular wings, with the heat sealed inner pouch being retained by pressure adhesive to one side of the outer bag; and

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 (d) a second sealing station for activating heat-activated adhesive along a section of an inner surface of one of the out-turned sides of the outer bag and thereafter folding the out-turned sides of the outer bag inwardly so that the adhesive-carrying inner side of the outer bag overlies and contacts an outer surface of the other side and the activated heat-sensitive adhesive adheres the folded sides together, with the inward folding of the out-turned sides causing sections of each in-turned wing to fold inwardly to overlies other sections of the wings;

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 (e) a third sealing station for activating heat-sensitive adhesive along sections of surfaces of the in-turned wings of the outer bag and thereafter adhering the overlying sections of the wings together to complete the sequence of steps to close the open top end of the sack.

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 As is indicated above, the above-described apparatus, in a modified method of operation, can be used to form a top block end on other bulk packaging sacks, particularly as sacks that comprise outer bags but do not comprise inner pouches. Specifically, in this application, the modified method of operation is confined to carrying out the steps to fold and close the outer bag.

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The present invention is described further with reference to the accompanying drawings, of which:

Figure 1 illustrates an upper end of an as-manufactured sack in accordance with one embodiment of the present invention;

Figure 2 illustrates the sack shown in Figure 1 with the top end in an open position during a product filling operation;

Figure 3 illustrates the sack shown in Figures 1 and 2 in a partially folded position at one point of one embodiment of an apparatus for forming a top block end on the sack after the sack has been filled with product;

Figures 4 to 8 illustrate a number of the stations of the apparatus for forming the top block end.

The sack shown in the Figures comprises an inner pouch 5, typically made from a polymeric material, and an outer bag generally identified by the numeral 7, typically made from a paper-based material.

The sack is manufactured with a top end that (a) is open in the as-manufactured form of the sack so that the sack can be filled with product via the open end (see Figure 2), (b) has an "easy" open feature on the outer bag that facilitates opening the outer bag after it has been closed, and (c) and is formed so that it can be closed to form a block top end.

In the as-manufactured form shown in Figure 1 the sack comprises a bottom block end (not shown) and opposed sides 11.

In addition, the sack includes lines of dabs 21

of pressure sensitive adhesive that adhere together the upper sections of the outer bag 7 and the inner pouch 5 on each side of the sack.

5 As is described in more detail hereinafter, preferably the amount and/or the type of adhesive is selected so that the adhesion of the inner pouch 5 to the outer bag 7 is greater on one side of the sack than on the other side of the sack.

10 The easy-open end is of the type disclosed in Australian patent 760523 and comprises a cover sheet generally identified by the numeral 9 that is attached to the side 11 of the outer bag 7 that is shown in Figure 1.

15 The cover sheet 9 comprises a tear strip 13 and a first cover sheet section 9a and a second cover sheet section 9b that are separated by the tear strip 13. The first cover sheet section 9a is adhered to the side 11 of
20 the outer bag 7.

 The other side of the outer bag 11 of the as-manufactured sack comprises an upstanding top flap 15 and a strip 17 of hot melt adhesive on an inner surface of the
25 flap 15.

 As is described hereinafter, when the open end of the sack is folded to form a closed top block end, the top flap 15 overlies and is adhered to the second cover sheet
30 9b. In this position, the closed top block end can be opened by tearing the tear strip 13 to separate the first and second cover sections 9a, 9b.

 The as-manufactured sack also comprises two other
35 hot melt adhesive strips 19 positioned on each side 11 of the outer bag 11 shown in Figure 1. Ultimately, as is described hereinafter, the strips contribute to adhering

the folded sides of the sack in a top block end configuration.

The embodiment the apparatus for forming a top
5 block end of a filled sack described above includes a plurality of stations in a line, as summarized below, a conveyer belt that extends along the line and is positioned so that sacks that have been filled with product at a filling station (not shown) can be moved
10 along the line, and an upper guide that supports an upper section of each sack as the sack is moved along an upstream section of the line.

Figure 2 illustrates the sack in an open position
15 at the filling station.

The stations are summarized below.

1. Initial contact station. Assemblies contact
20 opposite sides of an open sack and press the sides together along a line of contact and support the sides in this position along the remainder of the line. Figure 1 illustrates the sack at this point on the line. The assemblies may include a means to adjust the vertical
25 position of the sack. The vertical adjustment operation is illustrated in Figure 4. The sack is moved forward from this station so that the upper section of the sack engages the upper guide.

30 2. First seal station. One or two heat seal bars press opposite sides of the sack together and heat seal the inner pouch 5. This is illustrated in Figure 5. This station may be constructed to form a vent seal in the inner pouch 5.

35 3. First folding station.

(a) Assemblies, for example in the form of suction cups, gripper bars or other means engage the pressed-together sides of the sack. The assemblies move the sides outwardly in opposite directions, with one "side" comprising one side 11 of the outer bag 7 and the other "side" comprising the sealed inner pouch 5 and the other side 11 of the outer bag 7, preferably adhered together (due to different glue properties and/or different amounts of the same glue). The assemblies move the sack sides outwardly and downwardly onto a horizontal support member. This movement causes inward folding of the "ends" of the sack that forms triangular wings (Figures 3, 7 and 8). One example of a suitable assembly comprises suction cups that swing inwardly from opposite sides and engage the sides and swing outwardly a short distance to partially open the pressed-together sides, a pair of plates that are hinged together at upper ends of the plates that moves downwardly into the open end and then swing outwardly and downwardly in opposite directions to fold the sides onto the horizontal support member. Another example of a suitable assembly comprises two pairs of oppositely acting gripper bars, with each pair being arranged to grip one of the sides and move the sides outwardly and downwardly onto a horizontal support member. This example of the assembly is illustrated in Figure 6. Figure 6 also illustrates that the sack may be formed with an outwardly folding flap on the side of the outer bag that does not retain the

inner pouch in order to facilitate the operation of the gripper bars.

- 5 (b) Assemblies move downwardly and contact the triangular wings 25 and press the triangular wings against the horizontal support member and thereby form fold lines. Figure 3 illustrates the upper end of the sack at this point in the line.

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4. Second seal station.

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- (a) A heated bar (not shown) activates heat-activated adhesive strip 17 on the top flap 15 of the side 11 of the outer bag 7.

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- (b) Assemblies fold each out-folded side of the sack, including the sections of wings 25 on each side, inwardly in turn so that one side overlaps the other side and so that the adhesive strip 15 is in the overlap region. Suitable assemblies are in the form of horizontally-disposed plates that move inwardly and outwardly to effect the sequential folding operation. Figure 7a illustrates one folding plate. Figure 7b illustrates the final position of the folded sides. The figure illustrates that the sides are selectively folded so that the inner pouch is laterally displaced from the overlapping regions of the sides. This ensures that the heat required to activate the adhesive that adheres the sides together does not affect the polymeric material of the inner pouch. The circled region 27 identifies the region of overlap in the figure.

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(c) A sealing bar presses down on the folded sides in the region of the overlap and further activates the adhesive so that the sides are adhered together.

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5. Third seal station.

(a) Hot air blowers are inserted into the partially opened ends of the adhered together, overlapping sides of the sack and hot air activates heat-activated adhesive strips 19 that now are positioned in the folded state of the sack as part of the folded wings 25. Figure 8 illustrates the adhesive strips 19 and the partially opened ends.

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(b) Sealing plates contact and press the partially opened ends downwardly and adhere the folded wings 25 together, thereby completing the formation of the top block end.

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The above-described apparatus is a particularly effective apparatus for forming a top block end of a filled sack of the type shown in Figures 1 to 3.

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The as-manufactured sack is suitable to be marked with a product identification code on the inner pouch 5 after the sack has been filled with product. This is an important feature in terms of product tracking, particularly in situations in which the outer bag is also marked with a suitable product identification code. It is not possible to gain access to inner pouches of current known sacks and apparatus for closing filled sacks.

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Many modifications may be made to the invention as described above without departing from the spirit and scope of the invention.

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By way of example, whilst the embodiment of the as-manufactured sack described above includes an easy-open end, the present invention is not so limited and extends to sacks that do not include easy-open ends.

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